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RDTE PROJECT NO.
USAAVSCOM PROJECT NO. 67-22
USAASTA PROJECT NO. 67-22

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ENGINEERING FLIGHT TEST

TH-55A PRIMARY HELICOPTER TRAINER LIMITED PERFORMANCE EVALUATION

FINAL REPORT

SAMUEL R. SCHWARTZ
CPT, CE
US ARMY
PROJECT ENGINEER

DONALD P. WRAY
MAJ, TC
US ARMY
PROJECT OFFICER/PILOT

NOVEMBER 1969

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US ARMY AVIATION SYSTEMS TEST ACTIVITY
EDWARDS AIR FORCE BASE, CALIFORNIA 93523

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ABSTRACT

A limited performance evaluation of the TH-55A helicopter was conducted in order to determine compliance with contract performance guarantees. Sixteen productive test flights were conducted during the period 20 April 1968 to 7 May 1968. All performance guarantees investigated during this test were equaled or exceeded. Flying qualities were investigated qualitatively during the performance tests and were satisfactory except for excessive longitudinal trim change required during autorotational entry.

TABLE OF CONTENTS

INTRODUCTION

BACKGROUND

1. The TH-55A helicopter is currently in use as a primary trainer by the US Army Primary Helicopter School, Fort Wolters, Texas. A second purchase of 396 TH-55A helicopters was made with deliveries initiated in December 1967. This additional procurement contract contains certain performance guarantees which must be verified by the government. The US Army Aviation Systems Command (USAAVSCOM) test directive 67-22 (ref 1, app I) directed the US Army Aviation Systems Test Activity (USAASTA) to conduct these tests in order to determine compliance with performance guarantees stated in the detail specification (ref 3).

2. Calibration of the engine installed in the test aircraft was necessary in order to conclusively determine compliance with the contractor's guaranteed performance. Because of contractual considerations with the Lycoming Division of Avco Corporation (the engine manufacturer), an engine calibration could not be obtained prior to the flight tests. Data were initially reduced using the engine detail specification (ref 4, app I) for power calculations, and a preliminary report (ref 5) was submitted in June 1968. After completion of the testing, the engine was removed from the test aircraft and stored until November 1968 when it was forwarded to Lycoming for calibration. After receipt of engine calibration data in February 1969, the test data were reduced to final form for inclusion in this report.

TEST OBJECTIVE

3. The objective of this test was to verify compliance with the performance guarantees specified in paragraph 3.1.2.2 of the detail specification. Unless otherwise stated, these guarantees apply at: a constant rotor rpm of 483; a forward center of gravity (cg) location at fuselage station (FS) 95; a mission gross weight (grwt) of 1604 pounds; the International Civil Aviation Organization (ICAO) sea level (SL), standard conditions (dry air). These guarantees are based on the engine detail specification.

DESCRIPTION

4. The TH-55A is a two-place helicopter manufactured by the Hughes Tool Company Aircraft Division. It incorporates a single three-bladed, fully-articulated main rotor and a two-bladed, teetering,

antitorque tail rotor. The seating arrangement is side-by-side, facilitating its use as a primary trainer. Power is supplied by a Lycoming HIO-360-B1A reciprocating engine with a SL takeoff rating of 180 shaft horsepower (shp) at 2900 rpm. The helicopter's empty weight is 1006 pounds, and the design grwt is 1670 pounds. The helicopter used during this test program was weighed prior to the start of the tests (app VI). Pertinent dimensions are as follows:

a. Main rotor diameter: 25.29 feet.

b. Overall length (rotors turning): 28.40 feet.

c. Overall width (rotors turning): 25.29 feet.

d. Overall height (struts extended): 8.58 feet.

SCOPE OF TEST

5. Sixteen productive test flights (a total of 26.1 hours) were performed in the vicinity of Edwards Air Force Base, and Bakersfield, California. All tests were conducted at the forward cg limit (FS 95.0) and at gross weights ranging from 1530 to 1670 pounds. Emphasis was placed on quantitative performance data, and stability and control information was obtained qualitatively. Since this aircraft is Federal Aviation Agency (FAA) certificated, no attempt was made to determine basic airworthiness. The operating limitations stated in the FAA approved manual provided by Hughes Tool Company Aircraft Division (ref 7, app I) were observed during this test except for never exceed airspeed (V_{NE}) which was exceeded (as required) during level flight performance tests.

METHODS OF TEST

6. The methods used in this test are outlined in the test plan (ref 2, app I). The test instrumentation is listed in appendix III.

7. Stability and control characteristics were evaluated qualitatively. No provisions were made to record quantitative handling qualities data.

CHRONOLOGY

8. The chronology of testing is as follows:

Test directive received	December	1967
Test aircraft received	January	1968
Test plan submitted	January	1968
Flight tests started	April	1968
Flight tests completed	May	1968
Preliminary letter report submitted	June	1968
Engine calibration data received	February	1969
Draft report submitted	September	1969

RESULTS AND DISCUSSION

GENERAL

9. The TH-55 helicopter meets or exceeds all contract guarantees as listed in table 1.

Table 1. Contract Guarantees.

Item	Unit	Guarantee	Actual Value	Exceeded Guarantee (%)
FAA certified V_{NE}	KCAS[1]	75.0	[illegible]	N/A
Cruise speed at NRP[2] or less	KTAS[3]	65.0	65.00 at 72.2% of NRP	N/A
Endurance at cruise speed specified in above item	Hours	2.5	[illegible]	[illegible]
Hover ceiling OGE[4], 110°F	Feet	[illegible]	[illegible]	[illegible]
Rate of climb (R/C): TRP[5]	fpm[6]	[illegible]	[illegible]	[illegible]
NRP (110°F, 1000 feet)	fpm	[illegible]	[illegible]	[illegible]
Normal autorotational speed at 483 rpm	KTAS	45.0	45.00	N/A
R/D[7] in autorotation at a 1000-foot pressure altitude (Hp), 110°F, 483 rotor rpm	fpm	2000.0	1616.00	[illegible]
Maximum altitude required to regain normal autorotational rotor rpm at 45 knots from minimum rotor rpm at a 1000-foot Hp, 110°F	Feet	[illegible]	[illegible]	[illegible]

[1]Knots calibrated airspeed.
[2]Normal rated power.
[3]Knots true airspeed.
[4]Out of ground effect.
[5]Takeoff rated power.
[6]Feet per minute.
[7]Rate of descent.

10. The flying qualities investigated were satisfactory throughout the flight envelope except for the high-speed autorotational entry characteristics. Because this aircraft was purchased as an "off the shelf" trainer and has never been thoroughly tested by the US Army and because of the unsatisfactory autorotational entry characteristics observed during this limited test, a more complete evaluation of the flying qualities (to include quantitative data measurements) is desirable.

11. The results presented in this report are based on the test engine calibration data for determination of power-required characteristics and supersede the preliminary results as reported in reference 5, appendix I.

PERFORMANCE

Airspeed Calibration

12. The boom airspeed system of the test aircraft was calibrated using the ground speed course method. The system was calibrated for the airspeed range between 33 and 79.5 KCAS. Test results are presented graphically in figure 1, appendix II.

Hover

13. Free-flight OGE hover tests were conducted at a 50-foot skid height in wind conditions of less than 2 knots. Atmospheric conditions and the limited time available precluded the determination of in-ground-effect (IGE) hover performance. Results are presented graphically in figures 2 and 3, appendix II.

14. The OGE hover ceilings which are determined by the intersection of the respective power-available and power-required curves in figure 2, appendix II, were determined to be: a 4030-foot H_p for standard day conditions and a 1170-foot Hp for 110°F day conditions. This hot day hover ceiling exceeds the H_p guarantee value of 1000 feet by 17 percent. Figure 3, appendix II, presents the hover performance data in summarized, nondimensional form.

Climb

15. Continuous climb tests were conducted primarily to determine compliance with the respective climb guarantees. Two continuous climbs were performed. Since determination of a service ceiling guarantee was not required, these climbs were not continued to service ceiling but were terminated at a pressure altitude of

approximately 9000 feet. A series of sawtooth climbs was also conducted in order to determine correction factors for power (K_p) and weight (K_W) variations, as well as to confirm the climb speed schedule derived from level flight performance data. The K_p was obtained from equation 1 and was a constant of 0.878. The K_W was obtained from equation 2 and was 0.970 at a density altitude (H_D) of 2380 feet and 1.395 at a 5000-foot H_D with a linear variation with density altitude assumed. The results of the continuous climb tests are presented in figure 4, appendix II.

$$K_p = \frac{\Delta R/C}{\Delta SHP} \times \frac{W}{33,000} \qquad (1)$$

$$K_w = \frac{R/C_2 - R/C_1}{SHP \times 33,000\left(\frac{1}{W_2} - \frac{1}{W_1}\right)} \qquad (2)$$

16. The SL, takeoff rated power R/C was determined to be 1370 fpm which exceeds the guarantee value by 37 percent. The 110°F, 1000-foot H_P, normal rated power R/C was 835 fpm which exceeds the guarantee value by 67 percent. This hot day R/C was determined by correcting the standard day R/C at the density altitude determined by these ambient conditions for variations from standard weight and power.

Level Flight

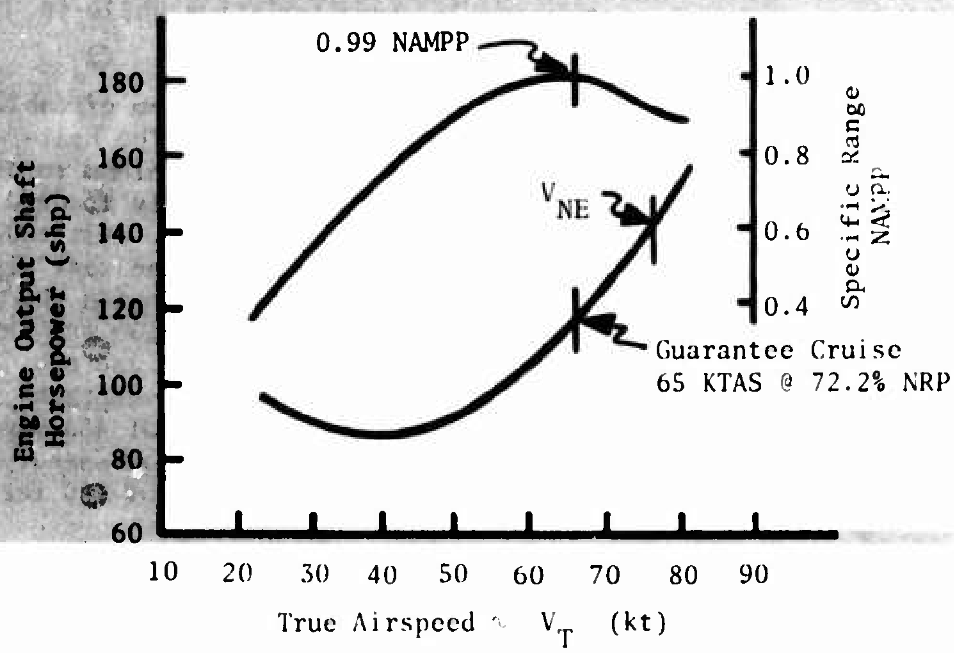
17. Level flight performance tests were conducted at density altitudes ranging from 1140 to 4730 feet and at gross weights ranging from 1530 to 1600 pounds. A rotor speed of 483 rpm was used for all level flight performance tests, and the cg was as near the forward limit as could be achieved. Results of these tests are presented in figures 6 through 9, appendix II, and the level-flight data are summarized nondimensionally in figure 5.

18. The fuel-flow data used for calculation of the specific range were taken from the Lycoming engine specification (ref 4, app I); the applicable portion of which is included as figure 10, appendix II. The test aircraft was not equipped with a cockpit fuel flow indicator; hence, in accordance with the operator's manual (ref 7, app I), manual leaning was not permitted. As a result, specific ranges calculated were based on the suggested high-limit fuel flow.

19. In order to determine compliance with the range and endurance guarantees, a level flight performance curve was derived from the

nondimensional level flight summary for SL conditions at a 1604-pound grwt and 483 rpm rotor speed. This curve is presented as figure A.

FIGURE A. TH-55A Level Flight Performance
Sea Level - Standard Day



20. Based on this curve, the guaranteed cruise speed of 65 KTAS is achieved at 115.5 shp, which is 72.2 percent of NRP (160 shp), and meets the guarantee. The endurance at this cruise speed is 2.69 hours based on 180 pounds of fuel in the tanks less 5 pounds of fuel for start, warm-up and takeoff with no reserve. This endurance exceeds the guaranteed value by 7.6 percent.

21. The aircraft was not power limited, and at all conditions tested, the FAA certified V_{NE} was encountered before the maximum power limit was achieved.

Autorotational Descent

22. Autorotational descent tests were conducted at an average density altitude of 4820 feet in order to determine compliance with the guaranteed performance as shown in table 1. A series of stabilized autorotational descents was performed at 483 rpm rotor speed and at various trim airspeeds in order to determine R/D versus airspeed. The results of these tests are presented in figure 11, appendix II.

23. The speed for minimum R/D was determined to be 42 KCAS (45 KTAS), and the R/D at this speed was 1615 fpm which is less than the guaranteed value of 2000 fpm. The guarantee states a "normal autorotational speed" but does not define the term "normal". It can only be concluded that this guarantee was met since 45 KTAS was determined to be the minimum R/D speed, and the helicopter did not exhibit any unusual or undesirable characteristics while in stabilized autorotation at this airspeed.

24. In order to determine compliance with the final item of table 1, a series of autorotational descents was performed. The helicopter was stabilized in autorotation at 45 KCAS and minimum rotor speed (380 rpm). The collective control was then rapidly lowered to the full down position and the altitude was recorded. Altitude was again recorded when rotor speed reached 483 rpm. The test was conducted at an average pressure altitude to correspond with the atmospheric conditions stated in table 1. Since technique was critical in this test, a total of eight descents was made, and the average altitude loss is reported here. It was determined that 165 feet are required to regain the normal rotor speed of 483 rpm from stabilized autorotation at 45 KCAS and 380 rpm rotor speed. This is 35 feet less than the guaranteed maximum value of 200 feet.

STABILITY AND CONTROL

General

25. Stability and control characteristics were evaluated qualitatively throughout this test program. Static longitudinal, lateral and directional stability appeared to be positive with no obvious reversals or discontinuities in either the control position or control force gradients. Control response was satisfactory both laterally and longitudinally. Directional control characteristics were satisfactory, but relatively high sensitivity contributed to yaw instability. The aircraft exhibited positive dihedral effect at all conditions tested.

Trimmability

26. The flight control system is of the reversible, nonboosted type and includes a conventional cyclic stick, collective stick and directional control pedals. An electrical trim system, operated by a four-way switch on the cyclic stick, positions the longitudinal and lateral centering springs. This trim system, which allows trimming of cyclic control forces in flight, was unsatisfactory. It was impossible to completely trim the longitudinal control force to zero particularly at high speeds. In addition, the harmony of the trim rates was poor in that the lateral trim

appeared to be more rapid and more effective than the longitudinal trim. It is desirable that increased trim authority be provided (Handling Qualities Rating Scale (HQRS) 4).

Dynamic Stability

27. The longitudinal dynamic stability was satisfactory; however, the helicopter exhibited poor dynamic lateral-directional characteristics. An essentially undamped yaw oscillation was apparent in forward flight with mild turbulence, and as the turbulence level increased, an uncomfortable roll/yaw oscillation developed. A similar instability was observed in hover with a right crosswind. Increased damping of roll/yaw oscillations is desirable for improved service use (HQRS 5).

Hover, Sideward and Rearward Flight

28. While sideward and rearward flight characteristics were not quantitatively evaluated, hover tests were performed at various wind speeds up to 20 knots. In general, these flight characteristics were satisfactory, but the following items were noted: At a forward cg when hovering with a tail wind, the cyclic stick is uncomfortably aft; in addition, when hovering with a right crosswind, continuous longitudinal and directional control inputs are required to maintain steady heading and position (HQRS 3).

Autorotational Entry

29. The autorotational entry characteristics were examined during the autorotational descent performance tests, as well as during simulated engine failures (throttle chops) at speeds up to V_{NE}. At lower speeds, the aircraft responses were relatively mild when power was lost and collective was lowered. A yaw to the left and a longitudinal trim change requiring aft cyclic control were apparent to the pilot. In addition, right-lateral cyclic control was required. However, at higher airspeeds the longitudinal trim change became more severe; and if pilot reaction was slow, the helicopter could achieve an uncomfortable nose-down attitude. This characteristic is considered to be a deficiency requiring mandatory correction (HQRS 7).

MISCELLANEOUS TESTS

30. The cockpit arrangement and location of instruments and controls were satisfactory. The seats are of a mesh fabric, metal tube construction and were quite comfortable. However, insufficient leg room existed even with pedals adjusted full forward for

the 95-percentile pilot. Cockpit visibility was generally excellent, although the restricted view created by the spoiler across the top of the cockpit canopy was at times annoying.

31. Ingress and egress to the relatively high cockpit, while initially somewhat awkward, were easily accomplished and are considered satisfactory. Preflight, engine start, rotor engagement and run-up procedures are simple and easily accomplished.

32. The manufacturer-provided operator's manual (ref 7, app I), which serves as a pilot's handbook, was inadequate. It contains only basic check lists, operating limits and very limited performance data. Neither information on flight characteristics nor a thorough discussion of systems and their operation is presented.

CONCLUSIONS

GENERAL

33. The TH-55A helicopter meets or exceeds the guaranteed performance characteristics stated in the detail specification (para 9).

DEFICIENCIES AND SHORTCOMINGS AFFECTING MISSION ACCOMPLISHMENT

34. Mandatory correction of autorotational entry characteristics should be made at the earliest possible time (para 29).

35. Correction of the following shortcomings is desirable for improved operation and mission capability:

a. Insufficient cyclic trim control throughout the flight envelope (para 26).

b. Inadequately damped roll/yaw oscillations during flight in turbulent air (para 27).

c. Inadequate operator's manual (para 32).

RECOMMENDATIONS

36. The deficiency, correction of which is mandatory, should be corrected as soon as possible.

37. The shortcomings, correction of which is desirable, should be corrected on a high-priority basis.

APPENDIX I. REFERENCES

1. Letter, USAAVSCOM, AMSAV-E(ER), subject: TH-55A Primary Helicopter Trainer Flight Test Directive No. 67-16 (changed to 22), 19 December 1967.

2. Test Plan, US Army Aviation Test Activity (USAAVNTA), Project No. 67-22, *Engineering Flight Test of the TH-55A Primary Helicopter Trainer Limited Performance Evaluation,* January 1968.

3. Specification, HTC-AD-JY-80-5, Hughes Tool Company Aircraft Division, *Detail Specification for a Primary Helicopter Trainer,* 17 March 1967.

4. Specification, 2313-B, Lycoming Division of Avco Corporation, *Detail Specification for Engine, Helicopter, Model HIO-360-B1A, -B1B, 180 Horsepower Direct Drive,* 10 March 1964.

5. Letter, USAAVNTA, SAVTE-E, subject: Preliminary Performance Flight Test Results for the TH-55A Helicopter, 19 June 1968.

6. Report, Lycoming Division of Avco Corporation, No. 3052, *Calibration of the HIO-360-B1A Engine, S/N L-4220-51A, For the U. S. Army Aviation Systems Command,* January 3, 1969.

7. Owners Manual, Hughes Tool Company, *U. S. Army Primary Trainer Hughes Model TH-55A,* November 8, 1967.

8. Report, AFFTC-TR-60-2, *ARDC YHO-2HU Air Force Flight Evaluation,* February 1960.

APPENDIX II. TEST DATA

FIGURE NO. 1
AIRSPEED CALIBRATION
TH-55A USA S/N 67-15374

TEST (BOOM) AIRSPEED SYSTEM
IN LEVEL FLIGHT

NOTES:
1. GROUND SPEED COURSE
   METHOD USED
2. DENSITY ALTITUDE = 1770 FT.
3. GROSS WEIGHT = 1530 LB.
4. ROTOR SPEED = 484 RPM
5. C.G. LOCATION = 95.3 IN. (FWD)

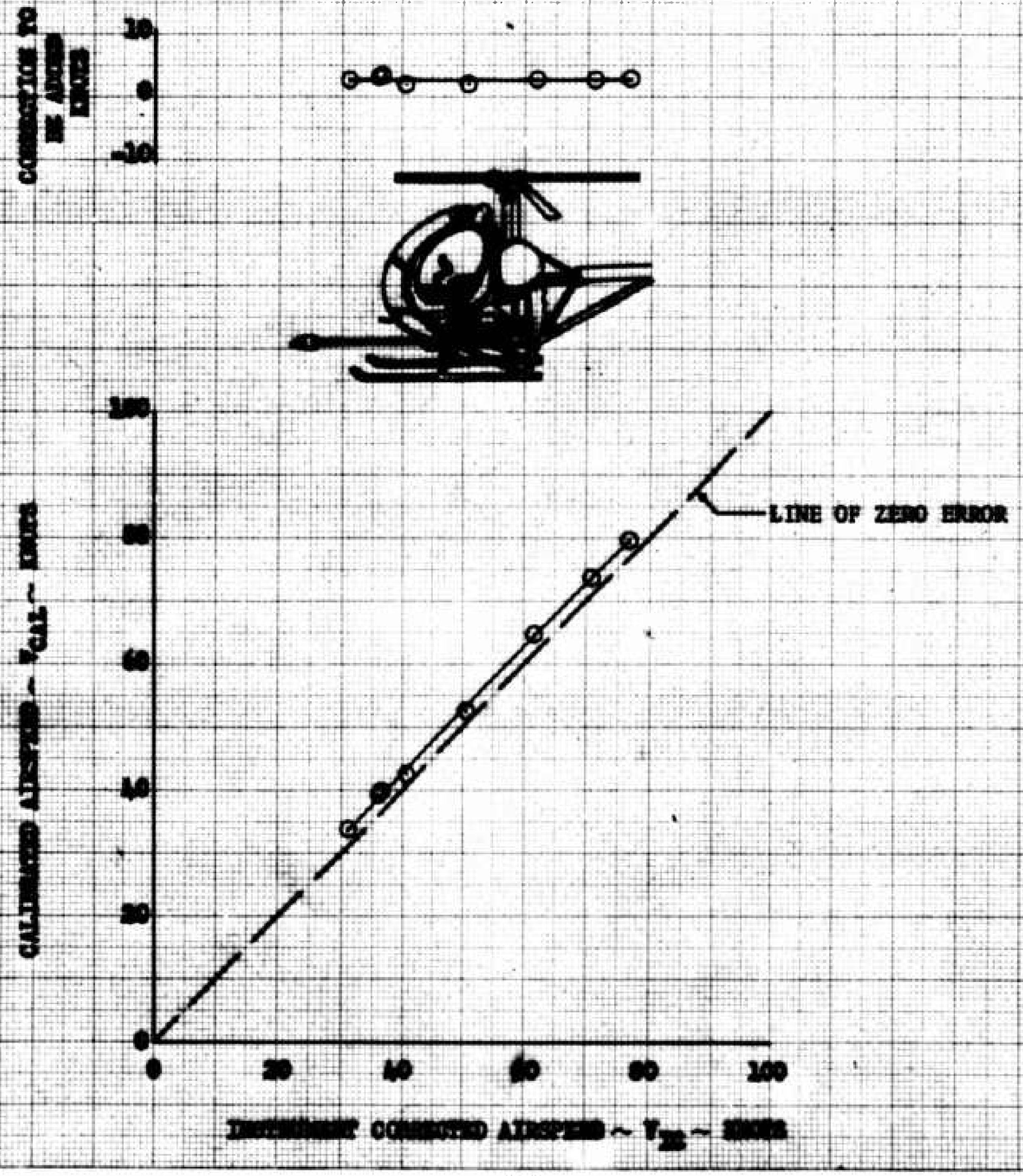


FIGURE NO. 2

O.G.E. HOVER CEILING DETERMINATION
TH-55A USA S/N 67-15394

GROSS WEIGHT = 1604 LBS.
ROTOR SPEED = 483 RPM

NOTE: Power available is based on the engine detail specification (ref 4, app I) corrected for losses as stated in the helicopter detail specification (ref 3).

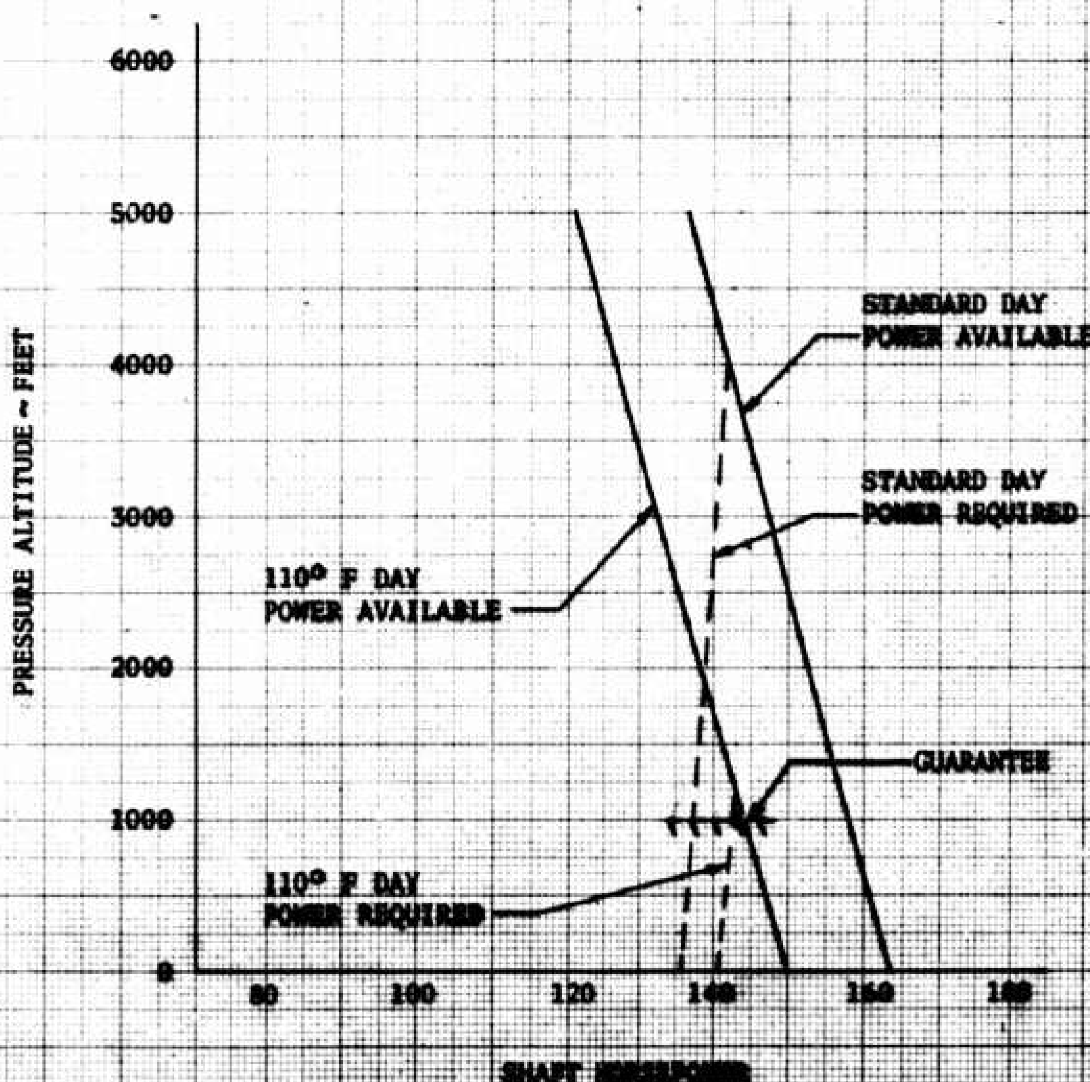
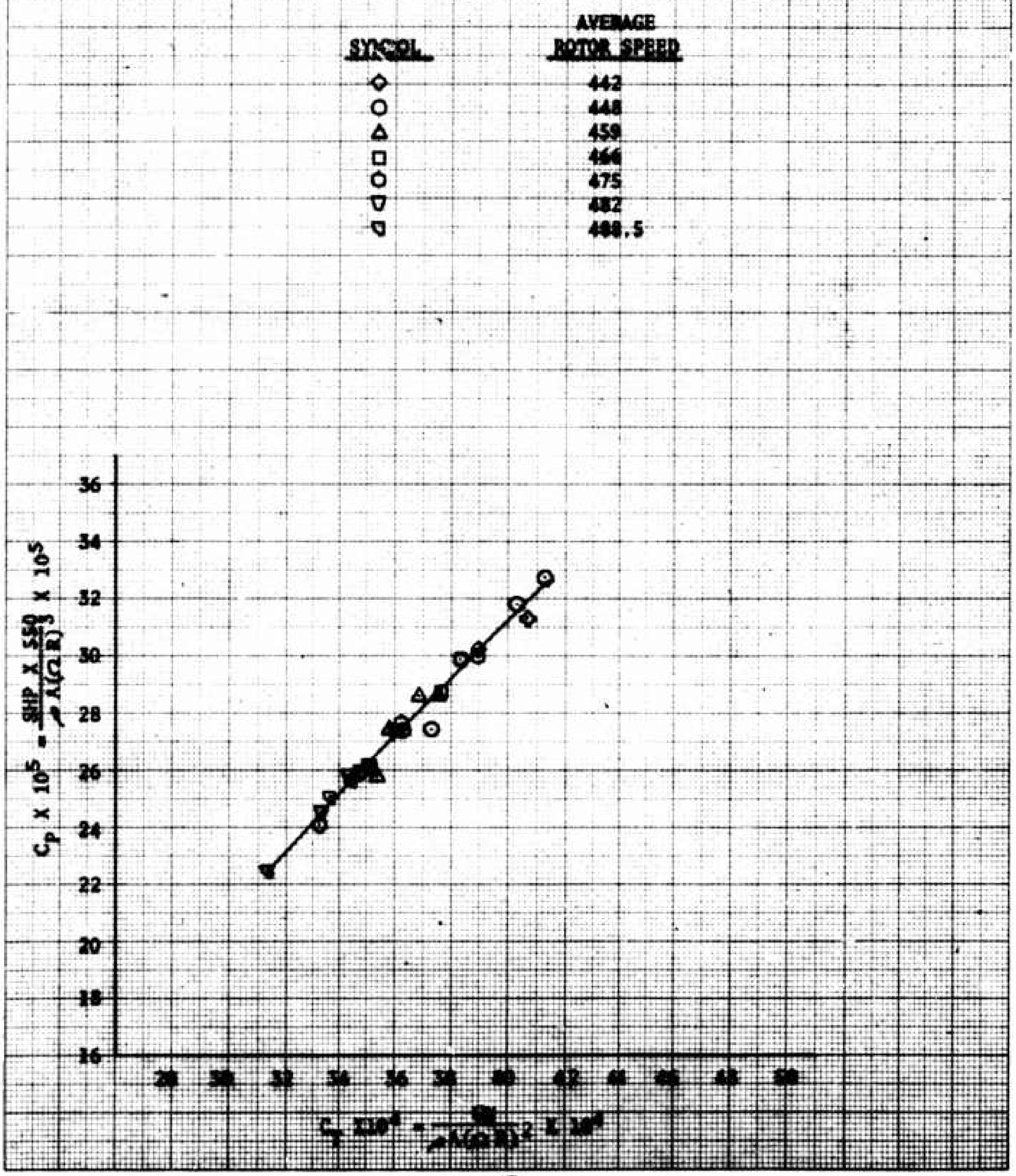


FIGURE NO. 3

NON-DIMENTIONAL HOVERING PERFORMANCE
TH-55A USA S/N 67-15394
HIO-360-B1A ENGINE

OUT OF GROUND EFFECT
SKID HEIGHT = 50 FT.



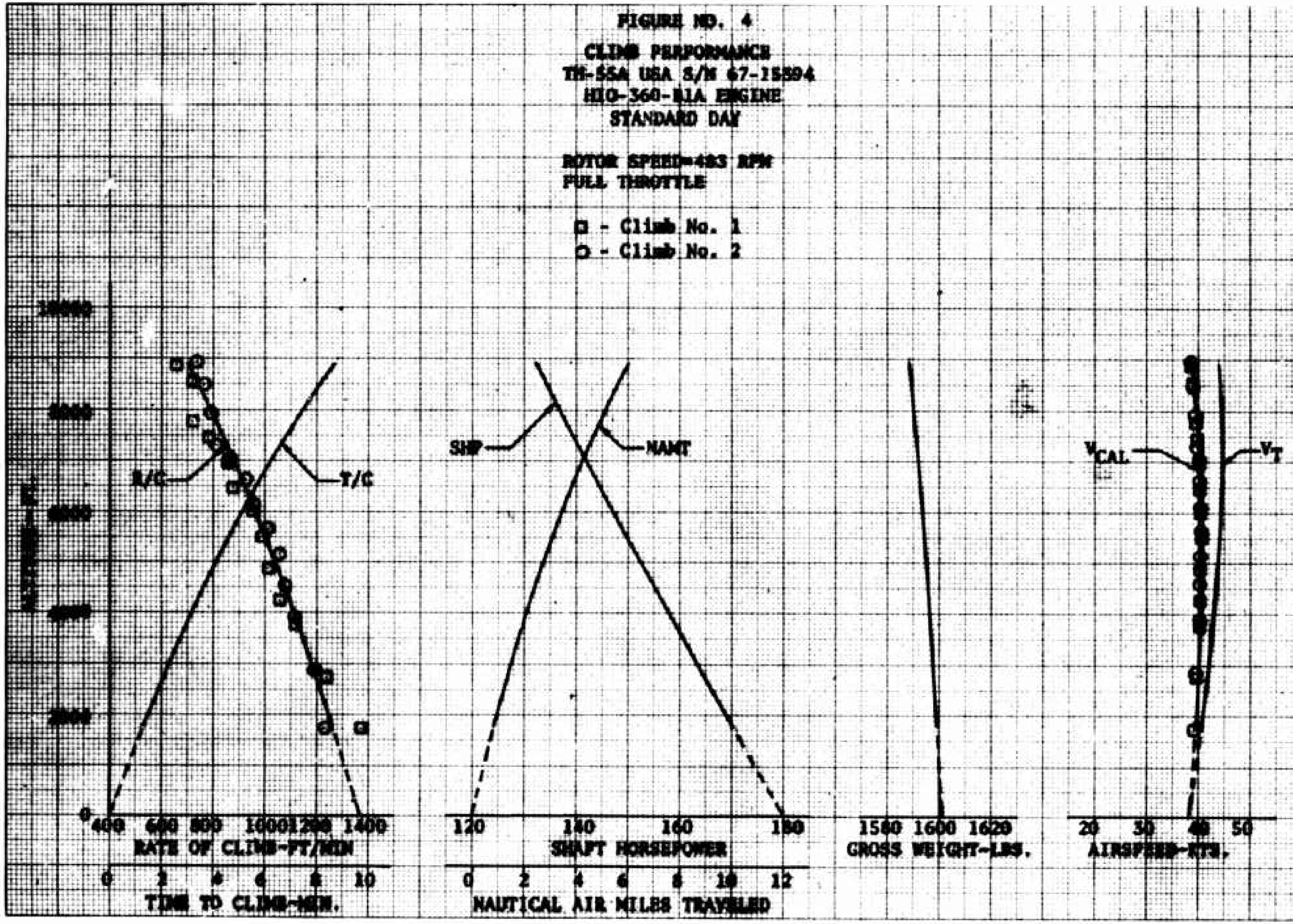


FIGURE NO. 4
CLIMB PERFORMANCE
TH-55A USA S/N 67-15394
HIO-360-B1A ENGINE
STANDARD DAY
ROTOR SPEED=483 RPM
FULL THROTTLE
□ - Climb No. 1
○ - Climb No. 2
R/C
T/C
SHP
NAMT
V_{CAL}
V_T
0
400 600 800 1000 1200 1400
RATE OF CLIMB-FT/MIN
0 2 4 6 8 10
TIME TO CLIMB-MIN.
120 140 160 180
SHAFT HORSEPOWER
0 2 4 6 8 10 12
NAUTICAL AIR MILES TRAVELED
1580 1600 1620
GROSS WEIGHT-LBS.
20 30 40 50
AIRSPEED-KTS.

FIGURE NO. 4

FIGURE NO. 5
NON-DIMENSIONAL LEVEL FLIGHT PERFORMANCE
TH-55A USA S/N 67-15394
HIO-360-B1A ENGINE

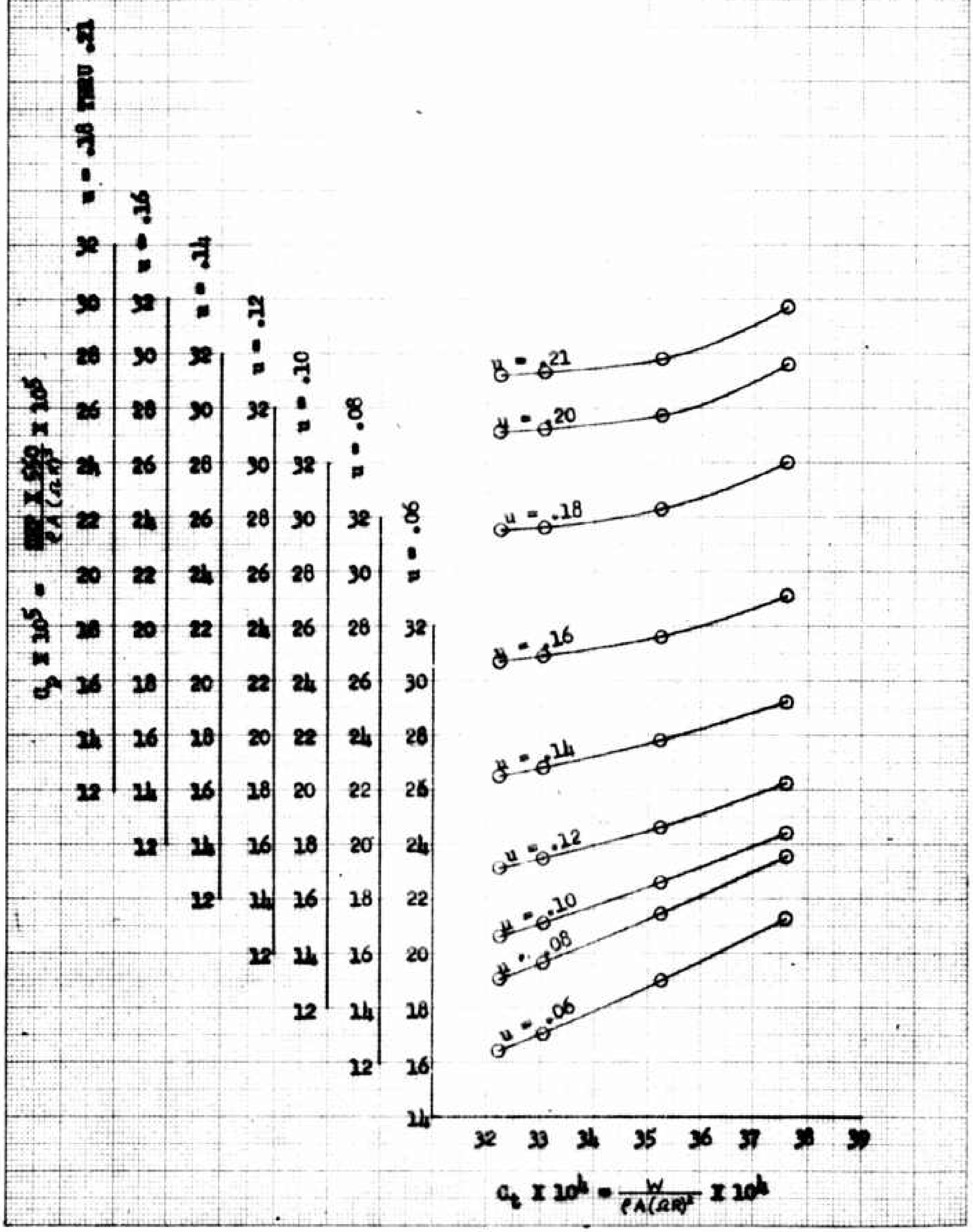


FIGURE NO. 6

LEVEL FLIGHT PERFORMANCE
TH-55A USA S/N 67-15394
HIO-360-BIA ENGINE

GROSS WEIGHT=1530 LB.
DENSITY ALTITUDE=1140 FT.
ROTOR SPEED=483 RPM
C.G. LOCATION=95.5 IN.(FWD)
C_T=0.003224

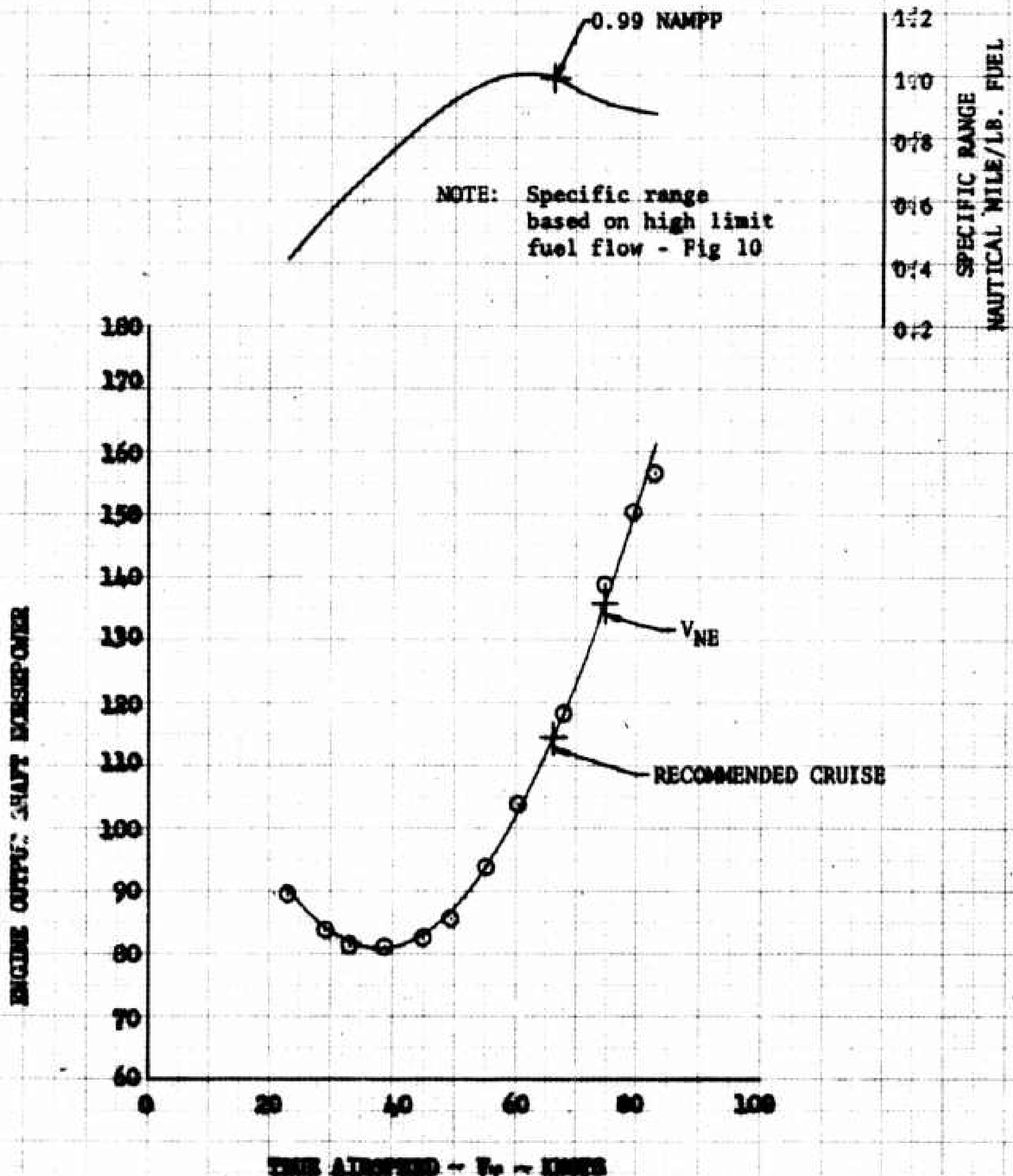
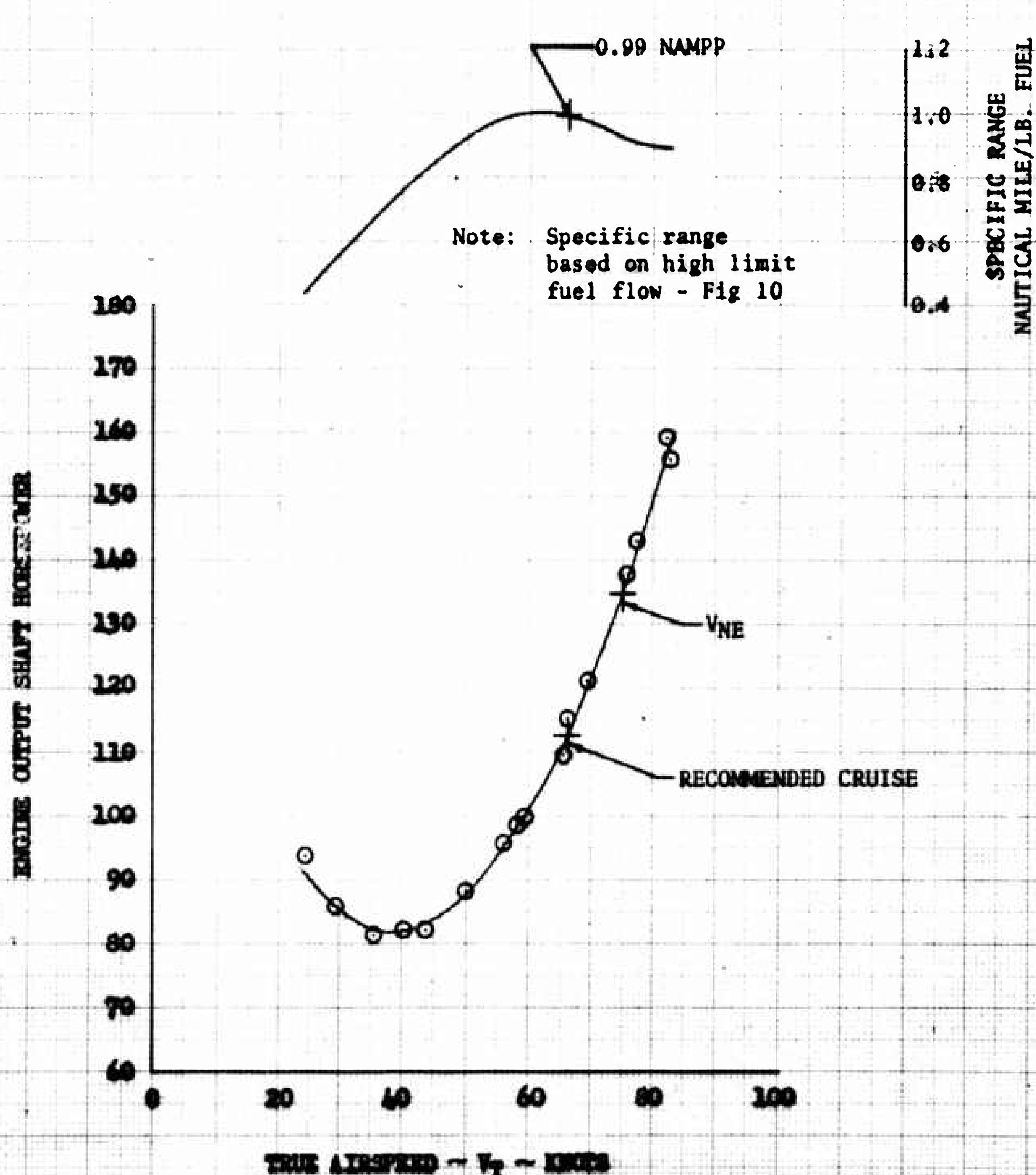


FIGURE NO. 7

LEVEL FLIGHT PERFORMANCE
TH-55A USA S/N 67-15394
HIO-360-B1A ENGINE

GROSS WEIGHT=1535 LBS.
DENSITY ALTITUDE=1800 FT.
ROTOR SPEED=483 RPM
C.G. LOCATION=95.5 IN.(FWD)
C_T=0.003305



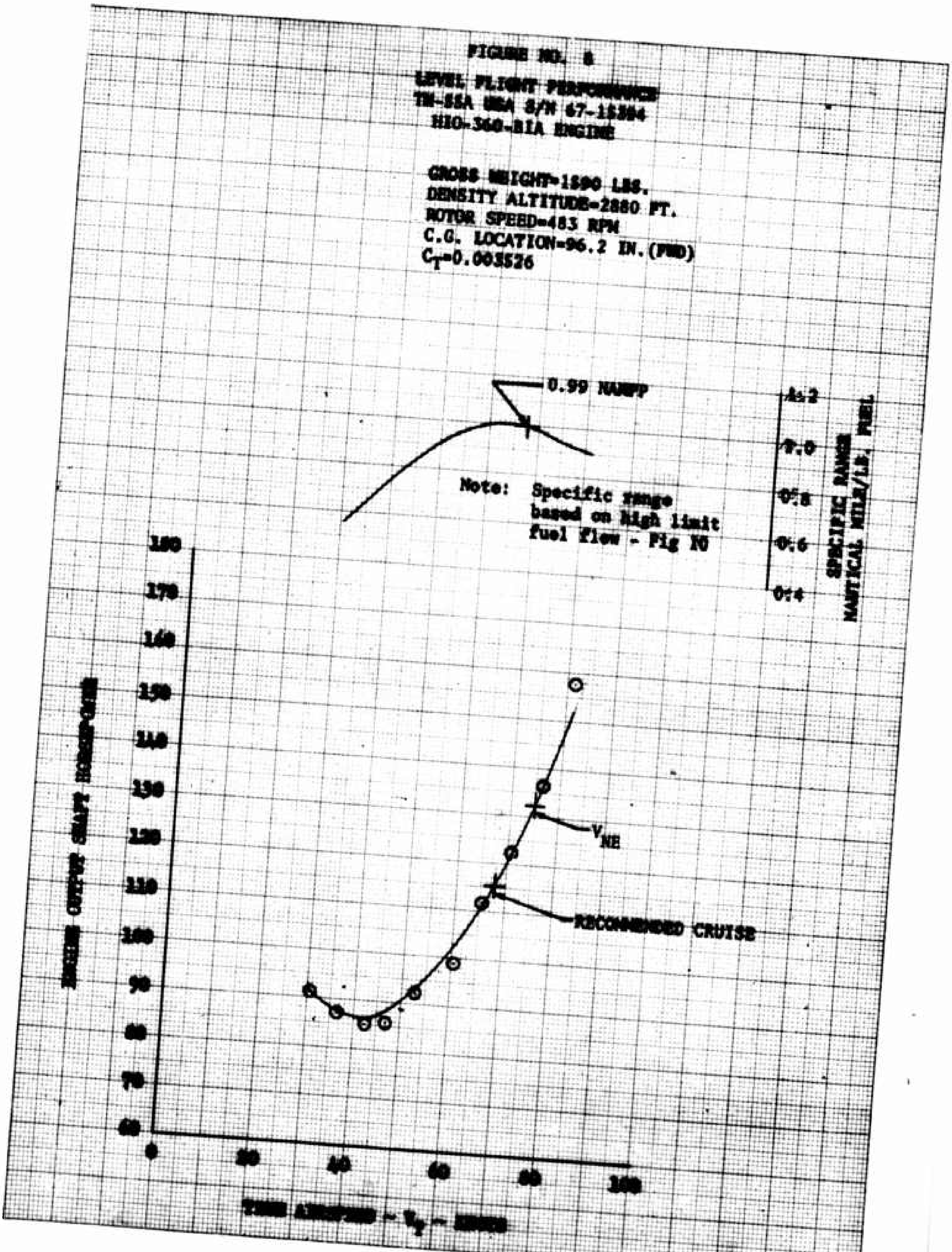


FIGURE NO. 8
LEVEL FLIGHT PERFORMANCE
TH-55A USA S/N 67-15384
HIO-360-B1A ENGINE
GROSS WEIGHT=1590 LBS.
DENSITY ALTITUDE=2880 FT.
ROTOR SPEED=483 RPM
C.G. LOCATION=96.2 IN.(FWD)
C_T=0.003526
0.99 NAMPP
Note: Specific range based on high limit fuel flow - Fig 10
SPECIFIC RANGE
NAUTICAL MILES/LB. FUEL
1.2
1.0
0.8
0.6
0.4
180
170
160
150
140
130
120
110
100
90
80
70
60
V_{NE}
RECOMMENDED CRUISE
0
20
40
60
80
100

FIGURE NO. 9

LEVEL FLIGHT PERFORMANCE
TH-55A USA S/N 67-15394
HIO-360-BIA ENGINE

GROSS WEIGHT=1600 LBS.
DENSITY ALTITUDE=4730 FT.
ROTOR SPEED=483 RPM
C.G. LOCATION=96.3 IN.(FWD)
C_T=0.003759

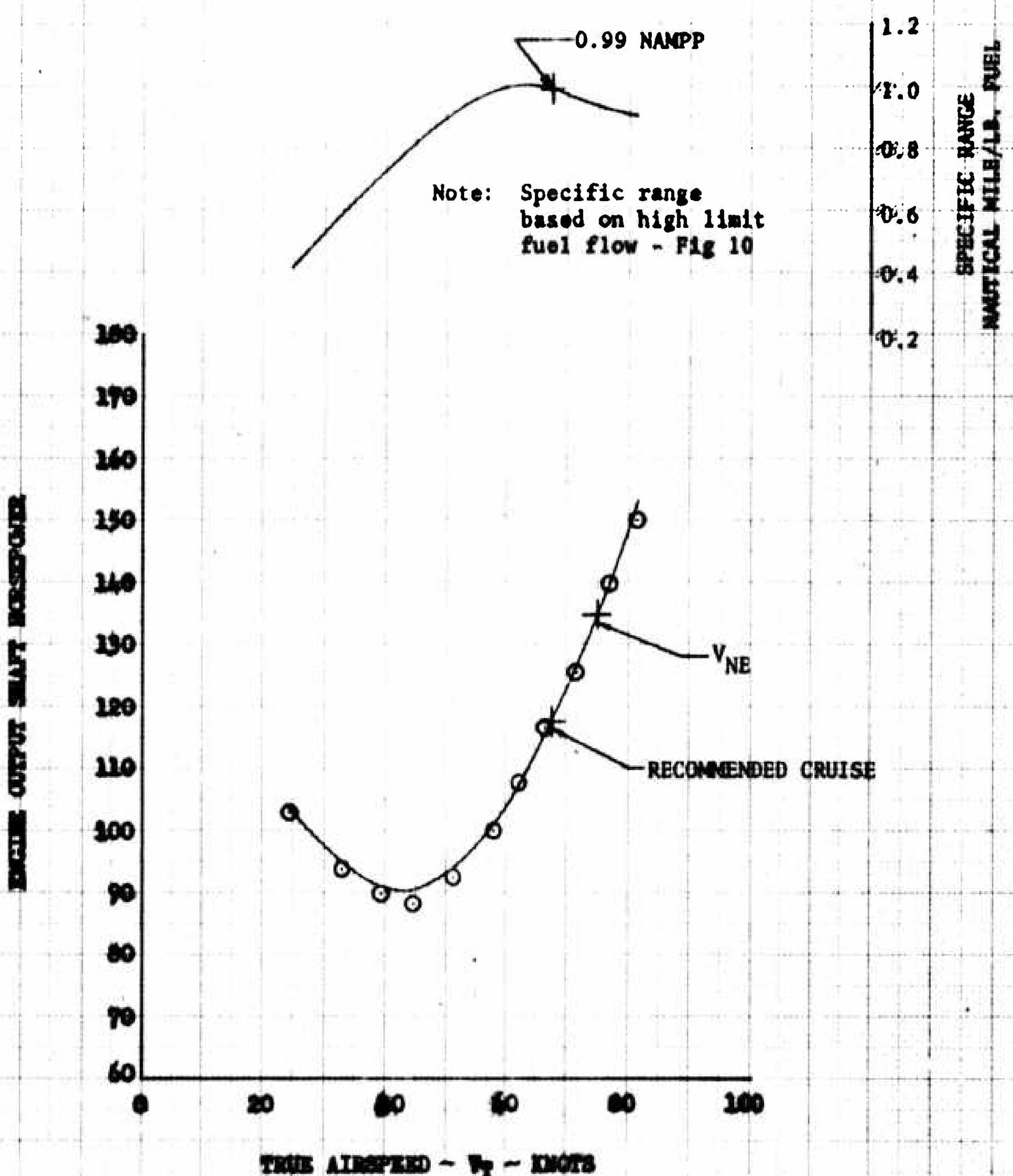


FIGURE NO. 10

SPECIFICATION FUEL FLOW

ENGINE - LYCOMING HIO-360-B1A

TAKEN FROM LYCOMING SPECIFICATION NO. 2313-B
MARCH 10, 1964

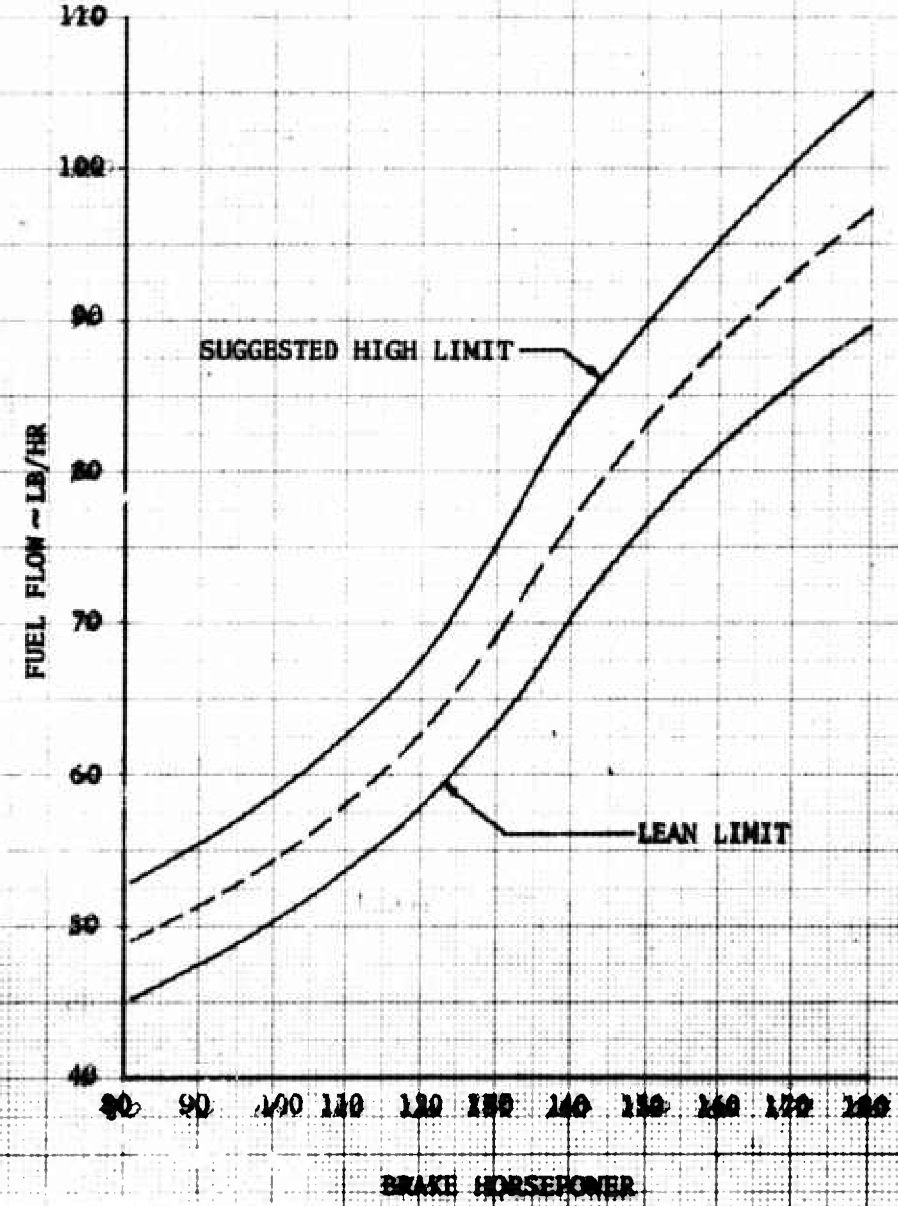
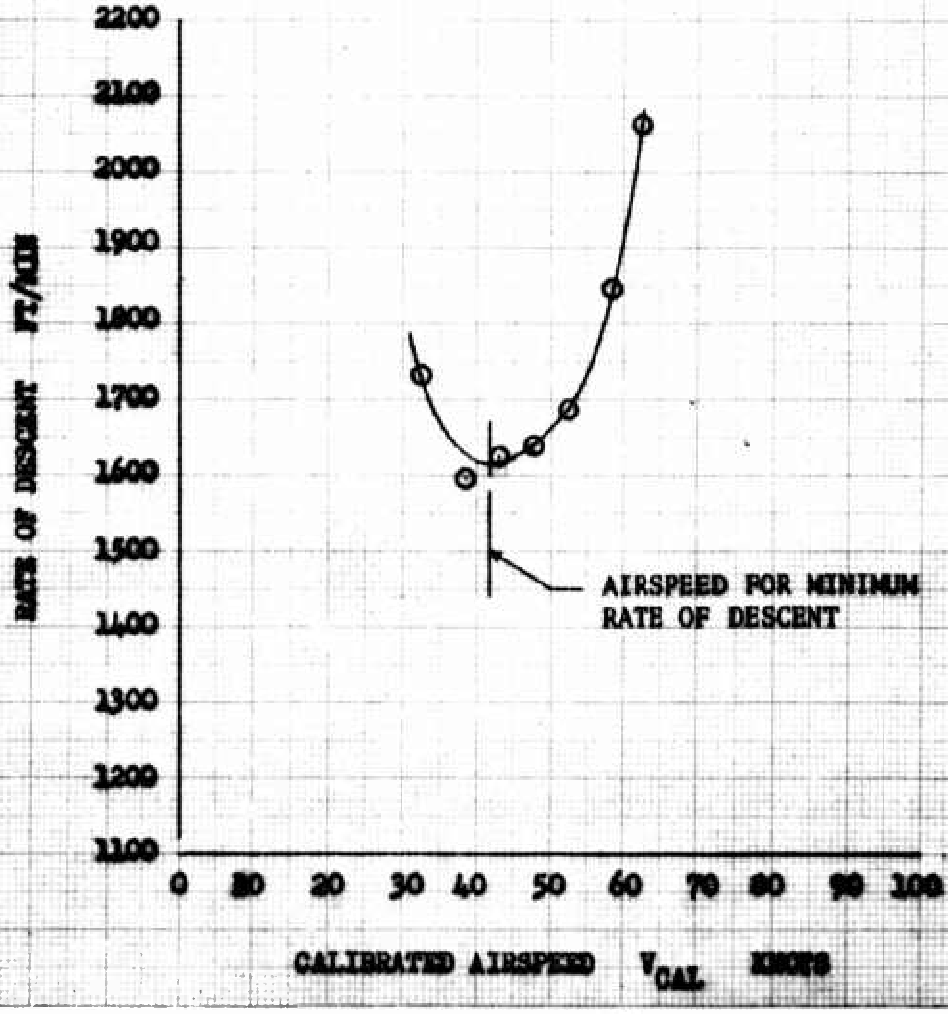


FIGURE NO. 11
AUTOROTATIONAL DESCENT PERFORMANCE
TH-55A USA S/N 67-15394

ROTOR SPEED = 483 RPM
GROSS WEIGHT = 1600 LB.
DENSITY ALTITUDE = 4820 FT.

NOTE: AIRSPEED POSITION ERROR BASED ON FIGURE 1.



APPENDIX III. TEST INSTRUMENTATION

Boom airspeed[1]
Boom altitude
Free air temperature
Fuel flow
Fuel used counter
Manifold pressure
Rotor tachometer
Cylinder head temperature
Fuel nozzle pressure
Manifold inlet temperature
Manifold inlet pressure
Engine tachometer
Engine torque
Vertical speed instantaneous
Turn and slip indicator

---

[1]Cockpit panel data were manually recorded. No photopanel or oscillograph was installed.

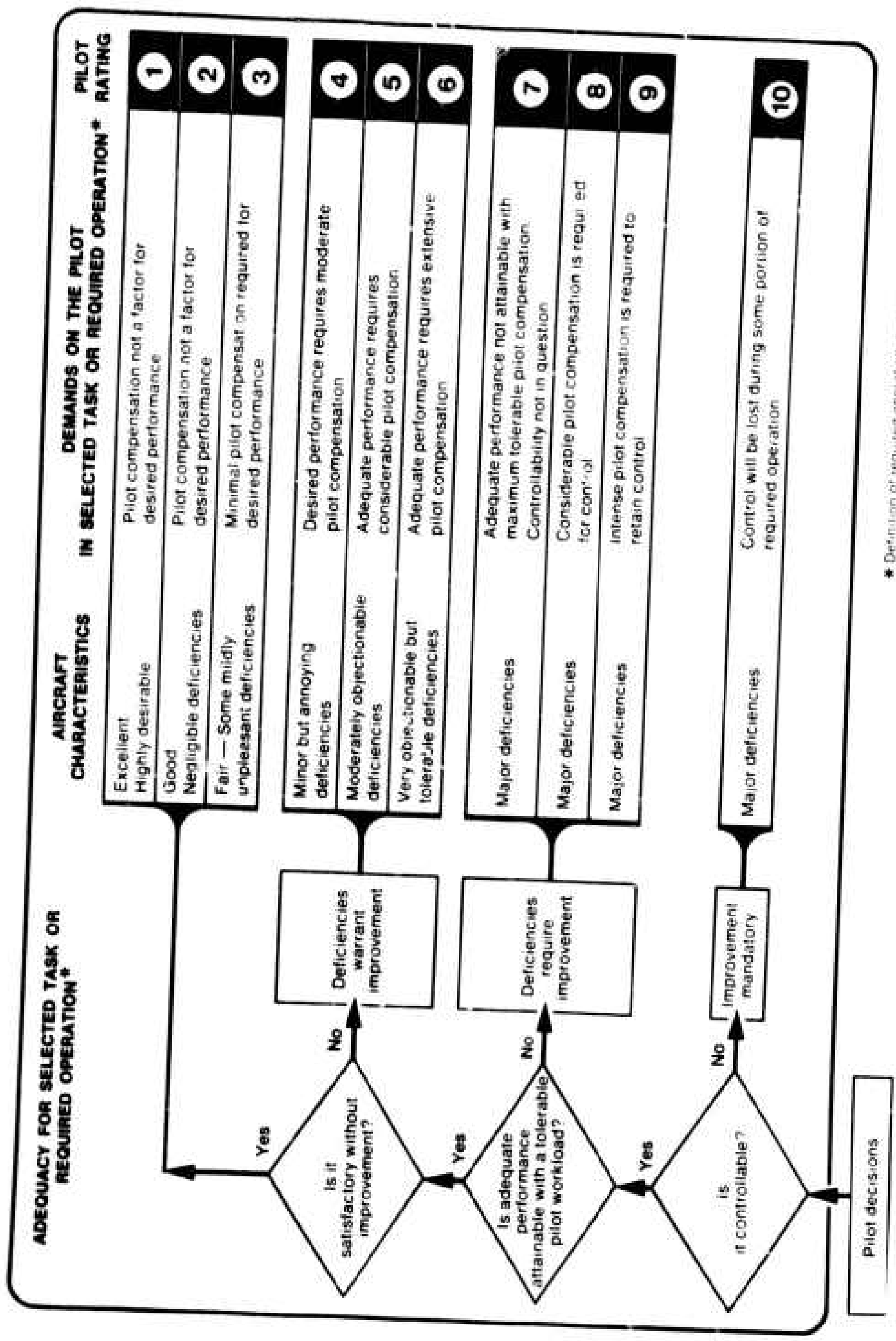
APPENDIX IV. SYMBOLS AND ABBREVIATIONS

Symbol	Definition
C_P	Power coefficient, a nondimensional unit of power
C_T	Thrust coefficient, a nondimensional unit of thrust or weight
°C	Degrees centigrade, a unit of temperature
°F	Degrees Fahrenheit, a unit of temperature
H_D	Density altitude, a measure of air density expressed in feet above sea level
H_P	Pressure altitude, a measure of air pressure expressed in feet above sea level
K_P	Power correction factor
K_W	Weight correction factor
V_C	Calibrated airspeed
V_{NE}	Never exceed airspeed
V_T	True airspeed
W	Gross weight
ρ (rho)	Air density, expressed in slugs per cubic foot

Abbreviation	Definition
CG, cg	Center of gravity; when used without prefix, usually refers to aircraft longitudinal center of gravity
fpm	Feet per minute
FS	Fuselage station
GRWT, grwt	Gross weight; all-inclusive weight, pounds
HQRS	Handling Qualities Rating Scale
IGE	In ground effect

Abbreviation	Definition
KCAS	Knots calibrated airspeed
KTAS	Knots true airspeed
NAMPP	Nautical air miles per pound of fuel
NRP	Normal rated power
OGE	Out of ground effect
R/C	Rate of climb
R/D	Rate of descent
rpm	Revolutions per minute
SHP, shp	Shaft horsepower, usually engine output shaft horsepower
SL	Sea level, zero or reference on every altitude scale
TRP	Takeoff rated power

APPENDIX V. HANDLING QUALITIES RATING SCALE



* Definition of required operation involves designation of flight phase and/or subphases with accompanying conditions.

APPENDIX VI. WEIGHT AND BALANCE

The test aircraft was weighed after the installation of the test instrumentation. The weight and balance was conducted in a closed hangar using an electronic weighing kit. The gross weight of the aircraft with no fuel was 1021 pounds, and the center of gravity was 99.15 inches to the rear of the reference line which is 100 inches forward of the rotor center line.

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SAMUEL R. SCHWARTZ, [redacted], ~~US Army, Project Engineer~~
DONALD P. WRAY, [redacted] ~~TC, US Army, Project Officer/Pilot~~

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13. ABSTRACT

A limited performance evaluation of the TH-55A helicopter was conducted in order to determine compliance with contract performance guarantees. Sixteen productive test flights were conducted, ~~during the period 20 April 1968 to 7 May 1968~~. All performance guarantees investigated during this test were equaled or exceeded. Flying qualities were investigated qualitatively during the performance tests and were satisfactory except for excessive longitudinal trim change required during autorotational entry.

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Limited performance evaluation TH-55A helicopter Performance guarantees equaled or exceeded Flying qualities satisfactory Except for autorotational entry Characteristics Due to excessive trim change						